VI. CLAIMS

7. A method for determining the maturation state and condition of a fruit with a computer serviced intrusion type plunger tester, comprising the steps of:

classifying a soft tissue fruit into three concentric zones consisting of a first zone extending spacedly inward from the fruit periphery, a third zone including the fruit core and a second zone bounded by the first and third zones;

mechanically moving an elongate plunger into the fruit through at least one data point in each of the said three zones of the fruit and determining plunger position relative to the fruit surface at each of the data points;

determining data relating to the viscoelastic properties of the fruit at each data point within the fruit;

analyzing the data relating to the viscoelastic properties of the fruit at each data point by comparing that data with a predetermined profile of similar data of similar fruit of predetermined condition and maturation state to determine the condition and maturation state of the tested fruit.

8. The process of Claim 7 further including the step of:

moving the plunger into the fruit at a constant predetermined velocity at at least one data point in each zone and measuring the pressure resisting plunger penetration into the fruit at the at least one data point in each zone.

9.　The process of Claim 7 wherein the data relating to the viscoelastic properties of the fruit is determined by:

maintaining the plunger in the fruit at a predetermined constant pressure at at least one data point in each zone and measuring plunger motion over a predetermined period of time at the at least one data point in each zone.

10.　The process of Claim 7 wherein the data relating to the viscoelastic properties of the fruit is determined by:

sequentially moving the plunger into the fruit at predetermined constant velocity and maintaining the plunger in the fruit under predetermined constant pressure for a predetermined period of time at at least one data point in each zone; and

determining both force resisting plunger penetration and distance of plunger motion under constant pressure at the at least one data point in each zone.

11.　The method of Claim 7 further including the steps of:

classifying an apple into three concentric zones comprising an R-1 zone extending from the fruit peripheral surface radially inwardly to a depth of substantially 0.320 inch, an R-2 zone extending radially inwardly from the R-1 zone to an R-3 zone and R-3 zone comprising the core area;

determining plunger position and pressure resisting plunger penetration into the fruit at at least one data point in at least two of the three concentric zones.

12.   The method of Claim 7 further including the steps of:

classifying an apple into three concentric zones comprising an R-1 zone extending from the fruit peripheral surface radially inwardly to a depth of substantially 0.320 inch, an R-2 zone extending radially inwardly from the R-1 zone to an R-3 zone and an R-3 zone comprising the core area;

determining initial plunger position, moving the plunger therefrom at a predetermined constant velocity and measuring pressure resisting plunger motion at at least one data point in at least two of the three concentric zones.

13.   The method of Claim 7 further including the steps of:

classifying an apple into three concentric zones comprising an R-1 zone extending from the fruit peripheral surface radially inwardly to a depth of substantially 0.320 inch, an R-2 zone extending radially inwardly from the R-1 zone to an R-3 zone and an R-3 zone comprising the core area;

determining plunger position and sequentially moving the plunger into the fruit at a predetermined constant velocity to determine pressure resisting plunger penetration and maintaining the plunger in the fruit under predetermined constant pressure for at least one predetermined period of time to determine plunger penetration under constant pressure both at at least one data point in at least two of the three concentric zones.

14.   The method of Claim 7 further including the step of:

determining a quality factor comprising a numerical value representing fruit condition by combining numerical values of pressure resisting plunger penetration at a predetermined constant plunger velocity and plunger penetration over a predetermined time at a constant plunger pressure as determined in at least two concentric zones of the fruit.

15. The method of Claim 14 further including the step of:

determining the quality factor by combining the numerical data in each of the at least two concentric zones of the fruit by averaging the numerical data from each zone, weighting the average of the data from at least one zone and combining the resultant averages for each zone.

16. The process of Claim 7 further includes the step of:

measuring frequency dependent pressure resisting plunger penetration at constant plunger velocity over a predetermined sequence of data points in at least two of the three zones; and

analyzing the numeric values of frequency dependent pressure variations at the sequential data points through finite Fourier transformation to derive a numeric measure representing fruit maturity and condition from the frequency dependent pressure values for comparison with similar values derived from fruit of the same type and of predetermined condition and maturation state to determine the condition and maturation state of the tested fruit.